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UNCLAS SECTION 01 OF 09 NEW DELHI 003128

STATE FOR OES/PCI, OES/STC, OES/SAT, OES/EGC, AND SCA/INS
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STATE PASS TO NSF FOR INTERNATIONAL PROGRAMS
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STATE FOR SCA, OES (STAS FEDOROFF); OES/PDAS/RHARNISH; OES/PCI;
OES/IHB MURPHY; OES/EGC GTHOMPSON
STATE FOR EEB/DAVID HENRY
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SLUG TO DOE/ (TCUTLER/GBISCONTI/CGILLESPIE)

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BEXP, EINV, KPAO, OEXC, SCUL, PINR, PREL, PGOV, IN
SUBJECT: CHALLENGES AND OPPORTUNITIES IN TECHNICAL EDUCATION IN
INDIA FOR A KNOWLEDGE ECONOMY

NEW DELHI 00003128 001.2 OF 009

¶1. (U) Summary: Technical education in India is expected to expand rapidly from its current level of 600,000 engineering graduates per year to about 800,000 in three years. It is also projected that India will experience shortage of skilled human resources to meet its developmental needs. Hence the Government of India (GOI) has increased the allocation for higher education over eight fold to INR 850 billion (USD 18.1 billion) for the Eleventh Five Year Plan (FYP) period (2007 - 2012). The funds are to be used for the creation of many new centers of excellence in technical education, expanding capacity and attaining a Gross Enrolment Ratio of 15 percent in higher education by 2012. In an effort to understand the issues involved in transformation of the current technical education system into a globally viable one and the opportunities therein for US-India collaboration, Post's Science Section in partnership with Public Affairs organized a dialogue among 15 invited experts in the technical education field. The challenges as envisaged during the course of the discussion included shortage of faculty, quality of curriculum, the process of affiliation, accreditation and ratings, governance, effective regulation for private and private public partnerships and industry academia interactions. The highlight of the discussion and the overall assessment of the technical education scene in India was an overwhelming interest in India to seek US support and participation in an effort to create these centers of excellence and a sustainable high quality technical education system. The support sought was essentially of US intellectual capital (US experts) and best practices in establishing these centers of learning. This offers a unique opportunity for a long-term partnership in technical education in this era of knowledge based economy. End Summary.

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The Need for Expansion of Technical Education
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¶2. (U) Higher education in India and especially technical education has been expanding rapidly in recent times. India today has over 400 universities and 20000 colleges of which about 2200 are engineering colleges producing over 600,000 engineers annually. Further, the growing population and the demographic composition make it necessary for India to look at expanding the educational infrastructure. The Gross Enrolment Ratio (GER), [an indictor used in the education sector by United Nations to indicate the percentage of students enrolled in a particular age group] in higher education in India was just 10 percent in 2007, as compared to near 100 percent in South Korea, 60 percent in US and Canada, over 40 percent in several European countries and more than 20 percent in even many developing countries.

¶3. (U) A relative stagnation in educational infrastructure and capacity expansion especially in the public sector in the last two decades as compared to the accelerated economic growth has necessitated expansion of capacity. GOI realizes that to sustain growth in this age of knowledge based economy, it has to leverage from advances in knowledge and use it as an effective tool for inclusive growth. To accomplish this, it has to literally revamp its marginally effective technical education system and make it globally competitive. With this as a key objectives the GOI has increased its budget and allocated INR 850 billion (USD 18.1 billion) for education in the Eleventh FYP (2007 - 2012), which is nearly an eight fold increase compared to the budget allocation of INR 96 billion (USD 2.04 billion) during the Tenth FYP (2001 - 2006). For the first time, the education budget has moved from typically single digit to thirty percent of the national budget for the current financial year 2008-2009.

¶4. (U) The accelerated capacity addition in technical education is further supported by the projected demand of over 3 to 5 million engineers by 2015 to address India's needs in diverse areas including the Information and Communication Technology (ICT), civil, mechanical, nuclear, electronics and electrical engineering and materials science. This is based on estimates by various industrial organizations like the National Association of Software and Services Companies (NASSCOM), the Associated Chambers of Commerce and Industry of India (ASSOCHAM), Confederation of Indian Industry (CII), Federation of Indian Chambers of Commerce and Industry (FICCI) and Indian Semiconductor Association (ISA). All these organizations not only favor expansion of the technical education, but call for greater private participation, less regulation and doing away with the current regulatory agencies like the All India Technical Council of Education (AICTE) which they believe is ineffective and at times, a hindrance to progress.

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New Publicly Funded Technical Institutions Being Set Up
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¶5. (U) This huge increase in budget by the GOI is expected to support not just existing institutions but also establish new ones. The new initiative includes setting up of over 30 central universities, 8 Indian Institutes of Technology (IIT), 10 National Institutes of Technologies (NIT), 20 Indian Institutes of Information Technology (IIIT), 5 Indian Institutes of Science Education and Research (IISERS), 7 Indian Institutes of Management (IIM) and 2 Schools of Planning and Architecture. Further, GOI is also expected to provide assistance to about 700 polytechnics. This is in addition to the GOI plan to help establish over 500 new universities which may also have technical programs. With all these new public and privately funded institutions, the GOI has set a target of 15 percent GER in higher education by the end of the Eleventh FYP period. International studies have shown that for any sustainable development, the GER needs to be above 20 percent.

Challenges to Expansion

¶6. (U) The principal challenge to this massive expansion of higher technical education is ensuring quality. Even from the current output of engineers, employers report that only 20 to 25 percent are qualified to perform assigned tasks. Most institutes have a severe shortage of faculty to meet even the basic teaching requirements. Finding faculty which could deliver quality teaching and also carry out R&D to meet the needs of a knowledge economy is expected to be a big challenge. The IITs alone have a faculty shortage of over a few thousand, in spite of their brand value, higher salaries, availability of the top students and offering a better environment for research. Dr. Jain, Deputy Director, IIT Delhi mentioned that the recent 54 percent expansion of student capacity among the existing seven IITs makes it mandatory for them to increase their faculty strength by 300 percent from their current level. When all the new IITs become fully operational they would need about 11,000 faculty by 2016. One could imagine the situation in other engineering colleges which are at best teaching shops. There are many more issues such as regulation of curriculum, autonomy to function effectively, fee structure regulation, private and foreign university participation, their affiliation and repatriation of profits.

Issues Relevant to the US

¶7. (U) In the US, Indian engineering graduates form the largest group of students studying in various universities and working in startups and high-tech companies. In addition, increasing number of US corporations who have set up production and/or R&D facilities in India employ thousands of local engineering graduates. Hence understanding the multiple challenges faced by technical education in India and its ability to deliver qualified human resources is of great significance to US. With the objective of understanding the Indian technical education scene and exploring opportunities for engagement, Post's Science Section hosted, in partnership with Public Affairs, a dialogue on "Challenges and Opportunities in Technical Education for a Knowledge Economy." About 15 leading technical education experts in India participated in this dialogue.

Participants in the Dialogue

¶8. (U) Below is the list of participants:

-- IIT Kanpur (IITK)
-- Prof. M. Anandakrishnan, Chairman, Board of Governors
-- Prof. Sanjay G. Dhande, Director
-- Prof. Vijay Stokes, Former IITK Faculty and GE Scientist

-- IIT Delhi (IITD)
-- Dr. Bijendra Jain, Deputy Director

-- IIT Roorkee (IITR)
-- Prof. Satish Kulkarni, Chair, Dept of Architecture and Planning

-- Jamia Hamdard University, Delhi
-- Dr. Shamim Ahmed, Vice Chancellor

-- Shreemati Nathibai Damodar Thackersey (SNDT) Women's University, Mumbai
-- Prof. Chandra Krishnamurthy, Vice Chancellor

-- World Bank:
-- Dr. Vinod Goel, Science, Technology and Innovation Consultant

-- ASSOCHAM
-- Mr. S. S. Chawla, Director, Education Section

-- Confederation of Indian Industry (CII)
-- Mr. Anjan Das, Senior Director & Head, Technology,

Intellectual Property Rights, Innovation & Life Sciences

-- FICCI
-- Ms. Shobha Mishra, Joint Director, Education

-- AICTE
-- Dr.Dinesh, Adviser, Quality Assurance

-- Defense Research and Development Organization
-- Prof. Manas Mandal, Director, Defense Institute of Psychological Research

-- Indo-US Science & Technology Forum (IUSSTF)
-- Dr.Arabinda Mitra, Executive Director

-- US Educational Foundation of India
-- Dr. Adam Grotsky, Executive Director
-- Ms. Sarina Paranjape, Adviser

-- US Embassy, New Delhi
-- Mr. Larry Schwartz, Minister Counselor for Public Affairs
-- Dr. Satish Kulkarni, Counselor for Science, Technology, Environment and Health Affairs
-- Dr. B. S. Satyanarayana, Scientific Affairs Specialist

Key Issues Deliberated in the Meeting

¶9. (U) The key issues discussed during the course of the dialogue were:

- Definition of knowledge based economy
- The quality or the current state of technical education in India
- Pros and cons of the rapid expansion of technical education
- The key factors that would influence a) curriculum, b) accreditations c) ratings and d) governance
- Industry academic linkages
- Privately funded institutions and
- Need for strong Indo-US collaborations

Definition of a Knowledge Based Economy

¶10. (U) Prof. Anandakrishnan, Chairman of the Board of Governors, IIT Kanpur, former Vice Chancellor of Anna University, Tamilnadu and India's first Science Counselor at the Indian Embassy in Washington DC stated that knowledge based economy may be defined as embedding benefits of knowledge in all the key factors enabling the economy namely capital, labor and technology, thus leading to value addition to the existing infrastructure. In other words, this calls for translation of knowledge to innovation and entrepreneurship that could cater to the changing needs of both the local and global economies.

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Current Technical Educations Standards in India
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¶11. (U) Prof. Anadakrishnan mentioned that out of the 600,000 graduating engineers, 25 to 30 percent who come from the IITs, NITs and other top-tier engineering colleges are well qualified. The need is to see how these engineers could be gainfully employed towards advancement of a knowledge based economy. He further added that many engineers have good theoretical knowledge, but insufficient practical experience or the necessary skills to perform assigned tasks and need additional training. Industry organizations like FICCI, CII and ISA have made similar observations.

¶12. (U) The remaining 70 percent engineering students find it difficult to graduate in one attempt and have to repeat the courses. This could be attributed to many reasons including poor quality of teaching and infrastructure and the lack of relevance of the

curriculum to the needs of industry and technological developments.

Absence of a R&D culture also affects faculty recruitment. India produced less than 1000 doctorates in all engineering disciplines put together in 2007. This leads to shortage of qualified faculty. For example, the state of Andhra Pradesh has 532 engineering colleges with a provision to admit 191,000 students. If it were to satisfy all the AICTE norms it should require nearly 11,000 faculty. But in reality there are not even 4,000 faculty and even these are predominantly entry level with at the most a master's degree. Nearly 80 percent of engineering colleges are in the private domain and a reasonable percent of them have good infrastructure as prescribed by the regulatory agencies; however, faculty shortage is an issue of great concern. Some institutes are trying to overcome this through collaboration with industries and R&D labs by hiring their staff as guest or adjunct faculty.

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Pros and Cons of Rapid Expansion of Technical Education
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¶13. (U) Most of the academics present were of the opinion that even though they agreed with the need for expansion, they were very much concerned about the rate of expansion based on political exigencies rather than any rational reasoning. The general belief was that it would further degrade the standards. So they called for a more gradual and planned step by step expansion which would be sustainable. However, the industrial organizations like FICCI, ASSOCHAM and CII felt that the expansion could not wait any more and it had to happen now. If the best practices were adopted the quality could be achieved, if not overnight at least over a period of time, say 10 to 15 years. They called for allowing more private participation or even public private partnership, but with more autonomy and simpler and clear cut regulations. Mr. Chwala from ASSOCHAM said that their study showed that in recent years, nearly five million Indian students were pursuing higher education in technical areas in foreign universities at any given point of time. This suggests that there is already a market for quality technical education.

¶14. (U) Dr. Dinesh of AICTE said that AICTE as the regulatory authority approving engineering programs had already facilitated nearly hundred percent expansion of technical education in the last decade. He added that in order to accelerate the process of approval, AICTE has also set up zonal offices. Prof. Vijay Stokes opined that there was a need for creation of new technical institutes of excellence in India as the existing engineering institutes including the IITs had failed to inspire or nurture innovation, entrepreneurship and path breaking technological ideas as generated in US universities like Stanford, Massachusetts Institute of Technology (MIT) and Princeton. He hoped that at least the new institutes coming up would hopefully provide thought leaders who could inspire the younger generation to take up engineering education and thus create a truly knowledge based economy thorough innovation.

Technical Education Curriculum

¶15. (U) Technology is changing rapidly. Product cycles have come down to literally eighteen months. Increasingly the boundaries between the various disciplines are disappearing. Yet technical education in India is highly compartmentalized and no serious effort is being made to make it interdisciplinary. AICTE, the key regulating body for technical education, discourages the study of humanities and even basic sciences in engineering colleges by giving

insignificant credits for these courses. Only the IITs and some autonomous engineering colleges have some exposure to humanities and basic and social sciences.

Affiliation, Accreditation and Ratings

¶16. (U) India does not have a viable accreditation and comparative rating mechanism. The method is flawed and there is a lot of mistrust in the system; hence the call by government bodies like the National Knowledge Commission (NKC) and the Administrative Reforms Committee (ARC) and industrial organizations like FICCI and CII for doing away with AICTE and similar agencies. India has over 17 agencies regulating higher education often working at cross purposes. There have been instances when a program from an engineering college has been accredited by AICTE, while the State University to which the college is affiliated has not even approved the college. In 2007, India has become a provisional member of the Washington Accord, an international accreditation body for engineering education. New Zealand is mentoring AICTE to achieve a full member status.

¶17. (U) Considering the above issues and the recommendations of the NKC, the GOI appointed a 22 member committee headed by Prof. Yashpal to study the working of the regulatory agencies like AICTE, the University Grants Commission (UGC) and the Medical Council of India (MCI) in February 2008. Prof. Yashpal is an eminent physicist and a space scientist who has headed several GOI agencies including the UGC. The committee is soon expected to submit its interim report. Newspapers have reported that some of the recommendations of the committee include granting of greater autonomy to universities, making the interdisciplinary approach a norm in higher education, the need to revamp the selection process of Vice-Chancellors and minimize the interference by the State and Central governments. In the case of IITs the committee seems to have suggested that they should evolve from just producing high-quality undergraduates into R&D institutions akin to MIT and broaden the curriculum to include life and social sciences similar to a university to draw upon the benefits of technology.

¶18. (U) One of the biggest challenges of the rapid expansion process is that there are no means to compare or rate the performance of the institutions. This was echoed by Prof. Anadakrishnan when he stated that indictors like the student teacher ratio, journal publications and infrastructure alone do not make a good institute. There should also be built-in mechanism for continuous self assessment and improvement. Some examples of initial steps towards self assessment are efforts by universities in Uttar Pradesh and Anna University in Tamilnadu. Universities in Uttar Pradesh on assessment found that out of the 170 engineering colleges under its fold about 20 of them had less than 5 percent of students clearing their exams showing the poor performance of these colleges. Similarly when Anna University with relatively better standard indicators of student teacher ratio, journal publications and infrastructure carried out an assessment, it discovered that about 25 percent of the colleges have less than 5 percent pass rate among its students. While universities in Andhra Pradesh which have nearly 500 engineering colleges among them have made no efforts towards self assessment or establishing a comparative rating mechanism. Further the accreditation agencies have some times rated some the poorest colleges as having the best performance. Hence an

urgent need to have a clear rating mechanism either self or through an agency. Most members present agreed that it was indeed very difficult to gauge the difference between the various institutions. NASSCOM the agency coordinating the interest of the ICT industries is now trying to evolve an all Indian assessment mechanism for rating the students coming under the ICT programs from various Institutes.

Governance of Engineering Institutions

¶19. (U) Governance is another big issue. The publicly funded institutes have to put up with interference from the government at every step. Majority of the privately funded institutes also suffer from poor management and lack of accountability. Profit seems to be the only motive although they are supposed to be charitable institutions. The government is proposing to set up new mechanisms

for public private partnership in higher and technical education, but the modalities are still not clear. The not-for-profit label associated with educational institutes seems to hinder entrepreneurs from investing in the education sector. The academics present during the discussion wanted stricter norms, while the industry organizations felt that some autonomy was necessary.

Industry Academic Linkages

¶20. (U) Technical education in India as discussed earlier has mainly been a pale imitation of the developed nations, rather than setting its own agenda. This could be partly attributed to the fact that Indian industries in a closed economy were content with the knock down kit assembly culture. They hardly needed to innovate, carry out R&D or interact with the academics. Except for a small minority, allocation for R&D in most companies would be minimal. The academics with their knowledge of technology developments in the West, felt that it was beneath their dignity to work towards incremental development of a low end technology for industry. Thus for nearly five decades there has been a complete disjoint between industry and the academia. However, the opening of the economy and its accelerated growth, the success of the ICT industry and the arrival of techno-entrepreneurs has catalyzed a close partnership between industry and universities.

¶21. (U) This is also reflected in the number of education initiatives launched by Indian companies like Infosys, Tata Consultancy Services, Wipro and Hindustan Computers Ltd (HCL), US companies like Intel and EMC Corporation and industry organizations like FICCI, CII, NASSCOM and ISA. They are increasingly organizing programs for faculty, developing new curriculum with academic institutions and facilitating the introduction of new courses. Endowed chairs funded by industries in Indian academic institutes are also increasing. Industries with their new found desire to collaborate with academia are also looking for immediate results. Further, not being able to wait for the transformation to take place in the academia, Indian companies including the Reliance, Tata, Wipro, Nirma and HCL are all starting their own institutes. Even government agencies associated with space, defense and atomic energy have started university level institutions to cater to their own specific needs. The increasing engagement between the two and the realization from both sides that they need each other if India is to make any headway in the knowledge based economy is encouraging.

Indo - US Collaboration

¶22. (U) Indo-US collaboration in research and education dates right back to the days of independence. This includes activities in areas like agriculture, space and nuclear technology or joint Indo-US efforts in setting up of an institute like IITK and the introduction of Satellite Instructional Television Experiment (SITE) or the concept of tele-education that has helped India spread education to the remotest corners today. These collaborations had US contribution in the form of both financial and Intellectual capital. Indian scientists and researchers have always had a great admiration for the US academic system and research environment. This can be gauged from the number of Indian students, engineers, scientists and faculty who are working in US and those that have returned to India, but continue to have research linkages with the US. Even though there is hardly any official mechanism for engagement in the area of high level research and education in the last two to three decades, the recent opening up of the environment, availability of sufficient funds and the starting of innumerable institutes in India, offers immense opportunities for engagement. Indian scientists and administrators believe that US can share its intellectual capital and the best practices of establishing institutes of excellence and help it create centers of excellences for the future.

¶23. (U) Prof. Dhande, Director, IITK highlighted this point when he said that the higher education scene in India was like a joint

family with institutes of varying capabilities, some good and some not so good. The GOI was like a patriarch supporting everyone. It was a grumpy joint family with no one ready to completely break away. Mediocre leadership was one of the main reasons for the poor performance of higher education in India. US could help here by educating more administrators of Indian universities, like the recent program where the US Embassy Public Affairs Office supported visit by Indian university leaders to the US for a meeting with their counterparts. Dr. Dhande also suggested the setting up of a "Think Tank for Education" in India where agencies like the national academies, USEFI and IUSSTF could facilitate interaction between the two countries.

¶24. (U) The SciCouns while summing up the discussion highlighted that the challenges faced by the two countries were similar. He cited the example of the US National Academies report "Rising above the Gathering Storm" and Indian reports from the NKC and the Prime Minister's Science Advisory Council and similarities of some of the key challenges which include:
- Making science and math more attractive at the school level so that students would take it up as a career;
- Ensure quality along with quantity (both in the case of students and faculty), enhance investment in R&D (private and public);
- Higher level of transparency in the peer review process;
- Accelerate the rate of growth of Indian science;
- Unshackle science from bureaucracy, and
- Inculcate an innovation culture.

Comments

¶25. (U) The massive expansion in technical education is expected to continue over the current Eleventh FYP and to certain extent in the Twelfth FYP. Many countries including the UK, Australia, Germany and Canada have enhanced engagement with Indian technical institutes

and are partnering with them in setting up of new centers of excellence. Yet Indian administrative, scientific and technological planners believe that the US, as the global leader of intellectual capital, would be the best source to seek help from to set up sustainable centers of excellence. The engagement could include planning for the formal structure of the institutes, involvement in developing curriculum, help in faculty training, collaborative research and participation in think tank activities. This overwhelming interest across the spectrum offers a unique window of opportunity for US engagement and extension of a positive influence at all levels from the highest policy makers, to the academicians, scientists and engineers to the vast number of engineering students who would be beneficiaries of this. Additionally, the US could draw upon all the goodwill generated and resources created for mutual benefits. End Comment.

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